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(12) UK Patent Application (19) GB (11) 2 289 418 (13) A

(43) Date of A Publication 22.11.1995

(21) Application No 9509784.6

(22) Date of Filing 15.05.1995

(30) Priority Data

(31) 9401681

(32) 16.05.1994

(33) SE

(51) INT CL<sup>6</sup>  
A61F 13/15

(52) UK CL (Edition N )  
A5R RPG  
A3V V1B3B V6C4

(56) Documents Cited  
GB 2193625 A WO 91/10416 A1 US 5246432 A

(58) Field of Search  
UK CL (Edition N ) A3V , A5R RPF RPG  
INT CL<sup>6</sup> A61F 13/15

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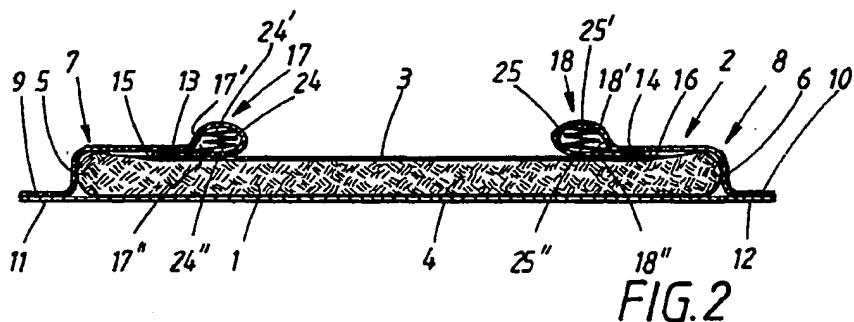
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(54) Absorbent article with elastically resilient means

(57) The article, which may be a sanitary napkin, comprises an absorbent core 1, a liquid-pervious cover sheet 3 on a first, user-facing side and a second cover sheet 4 on the other side, the first side having longitudinal liquid barrier means 17, 18 folded to form channels each with a longitudinal tunnel wall. The channels enclose longitudinal means having an elastically resilient, supporting action acting in all transverse directions against the tunnel wall. The barriers, which prevent leakage, may be formed by folding over of edge strips 5, 6 or by folding of the cover sheet 3 itself and the elastic means may comprise a cloth strip of bellows-like crosssection or a cord of foam or fibre material. Apparatus for making the article includes a fold-over device, means for continuously feeding the elastic means into the fold and devices for sealing the fold.



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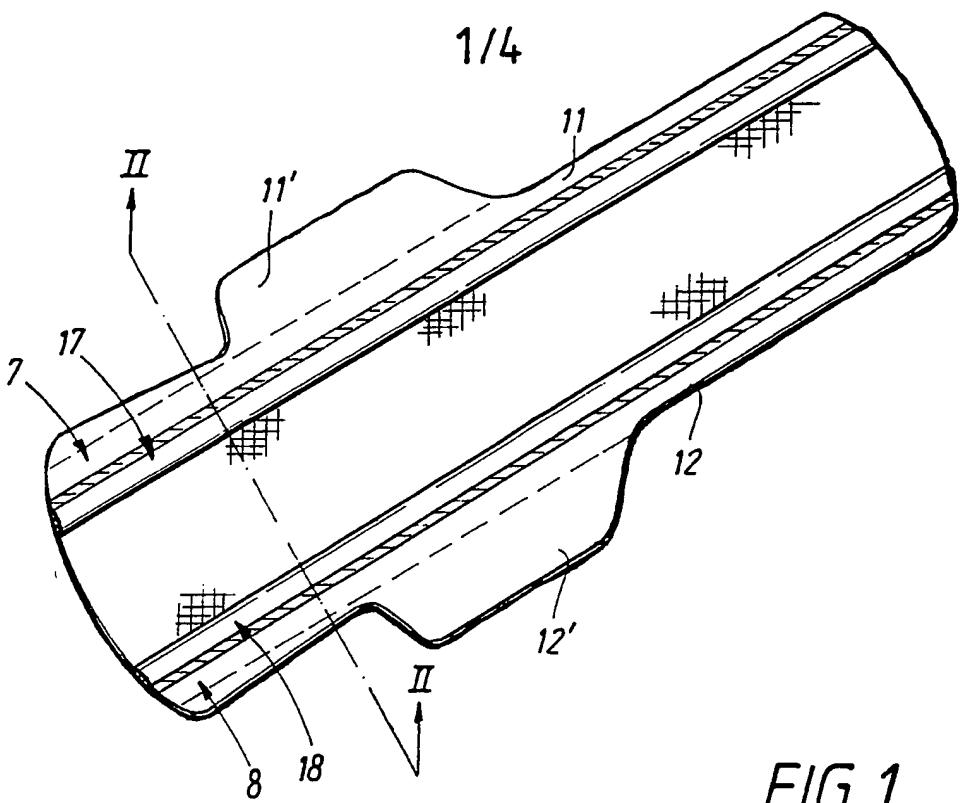


FIG. 1

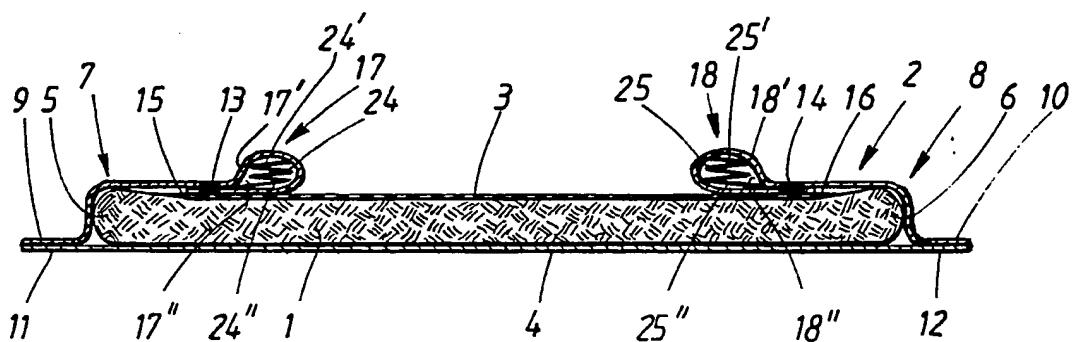


FIG. 2

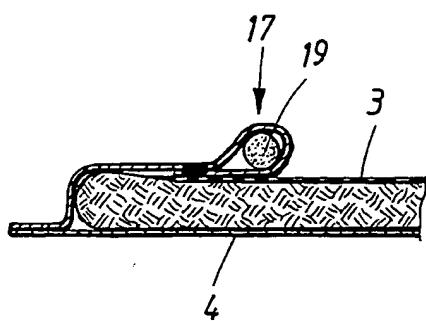


FIG. 3

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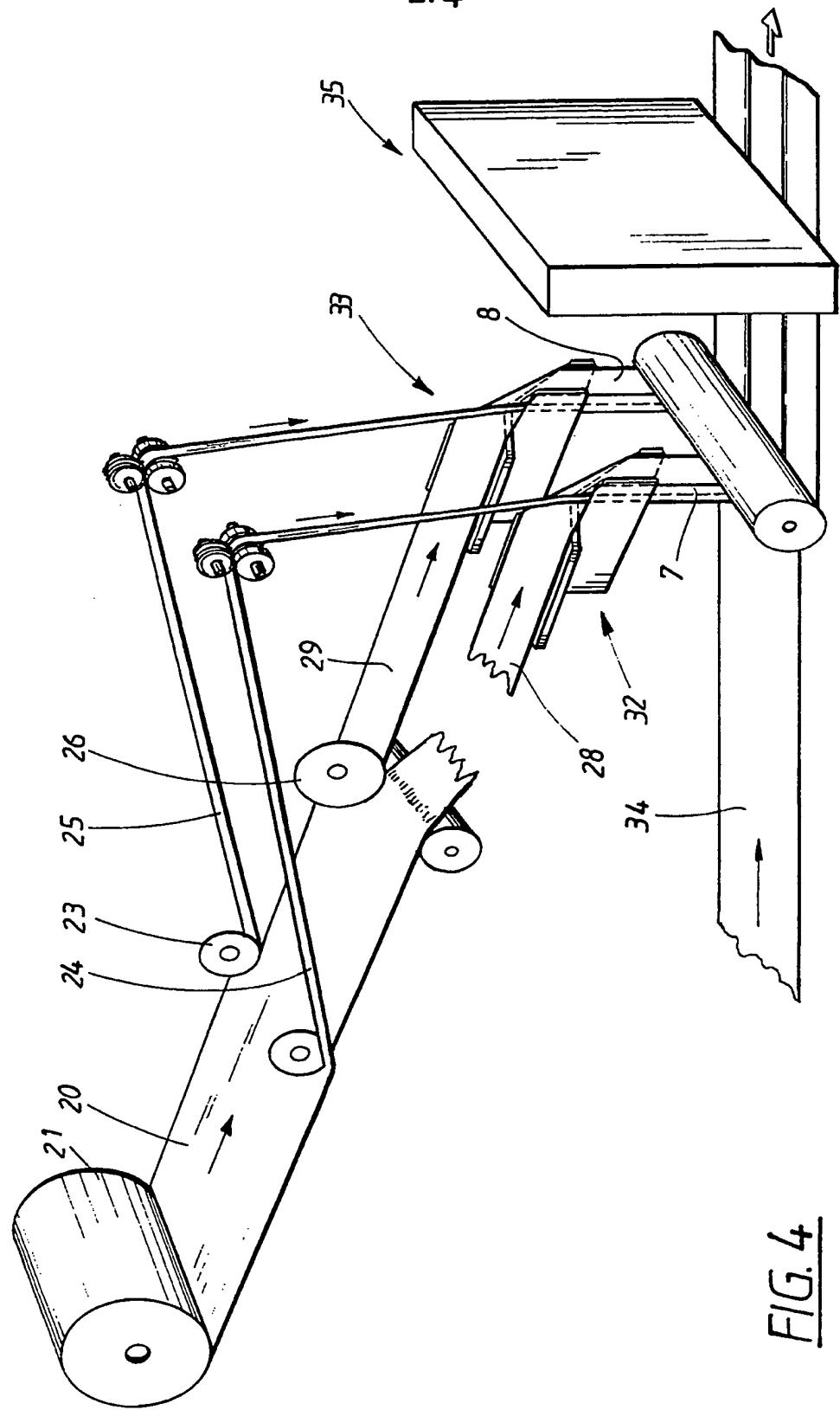


FIG. 4

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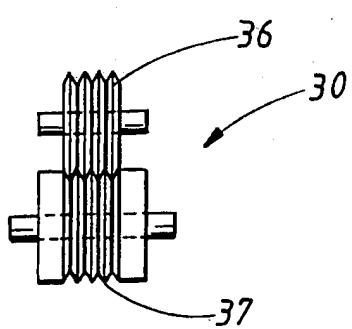


FIG. 5

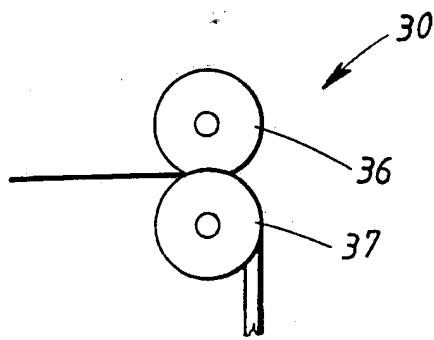


FIG. 6

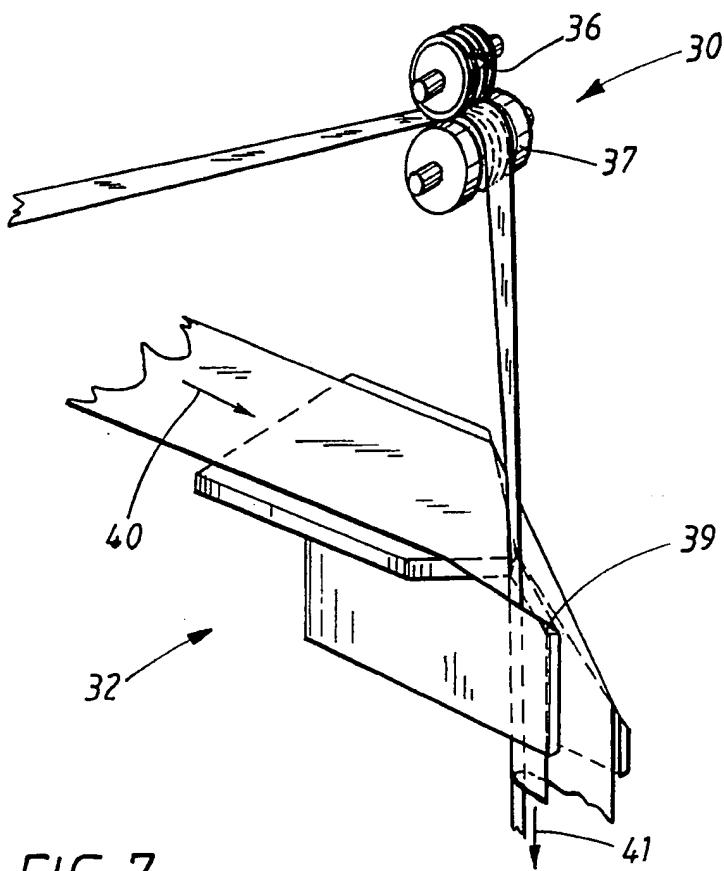


FIG. 7

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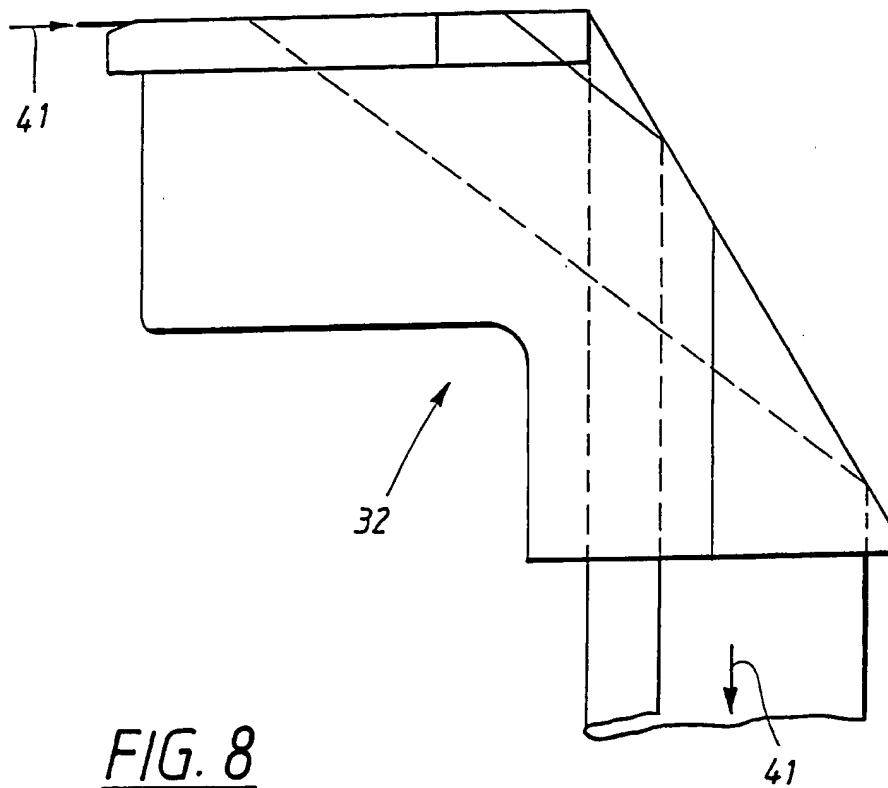


FIG. 8

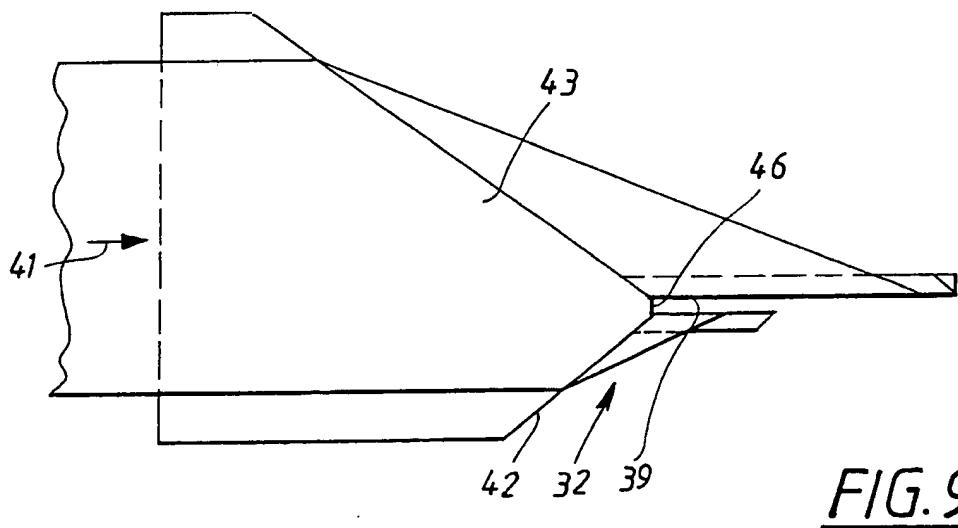


FIG. 9

5

## TITLE

A disposable liquid-absorbent article, method and apparatus for its manufacture.

## 10 TECHNICAL FIELD

The present invention relates to a liquid-absorbent article according to the preamble of the appended claim 1.

15 The present invention also relates to a method and an apparatus for the manufacture of a liquid-absorbent article, according to the preamble of the appended claim 6 and 9 respectively.

20 The present invention more particularly relates to articles provided with leakage barriers primarily intended for use on sanitary towels, but that of course may be used on other types of absorbent articles such as incontinence protection, diapers or similar.

25 Edge-leakage is a widespread problem primarily on sanitary towels, since patches of menstrual blood are difficult to remove and are experienced as extremely embarrassing by the affected user. Sanitary towels, in contrast to diapers or the like, are fastened directly in the panties by the user herself. Since both the size and shape of ladies panties vary greatly, it may easily happen that the positioning of the sanitary towel is less than optimal and varies from one time to another and between different users. An additional factor that increases the risk of leakage is that the sanitary towel is deformed during use, or moves away from its original position in the panties. The negative effect of erroneous positioning or deformation of the sanitary

5 towel may to a certain extent be alleviated by the provision of raised edge-leakage barriers on each side of the longitudinal side-edges of the sanitary towel. Even if, by accident, the sanitary towel has assumed such a position that it will be wetted near an edge-portion, the liquid may thereby be prevented from pouring out over the edge and giving rise to soiling of the user's clothes.

10 Edge-leakage barriers are furthermore effective for controlling the spreading of liquid in the longitudinal direction of the sanitary towel. This is particularly useful in conjunction with the nowadays commonly available, extremely thin sanitary towels which often have an absorption core with high liquid-spreading capacity. The drawback 15 with such absorption cores, is that they usually spread out liquid equally well in all directions. Hereby, leakage arises as soon as the liquid reaches out to the side-edges of the sanitary towel.

20 BACKGROUND OF THE INVENTION

A number of different raised edge-leakage barriers are known in the prior art, see for example WO93/12795, showing edge-leakage barriers on a sanitary towel, which are formed by folded portions of the cover of the sanitary towel. An 25 elastic cord, fastened and prestressed at each end, extends along the inside of the formed folds and keeps the barrier raised in an in-use position. Ensuring a safe fastening of the ends of the cord means placing great demands upon the manufacture of the sanitary towels. Furthermore, the cord 30 does not counteract sideways flattening. Additionally, transversal folds are formed by the action of the elastic cord in the barrier-wall, which may be experienced as uncomfortable by the user.

35 An additional problem with modern sanitary towels, are that the surface material often consists of a perforated plastic

layer, having favourable characteristics in terms of high liquid-permeability, high surface dryness and little re-wetting (i.e. small risk that liquid is pressed back out again through the layer). Such a material is experienced as "plasticky" by many users and therefore it has become common to provide the edge-portions of the sanitary towels with more "textile" strips of non-woven material (fibre cloth). An example of a document describing such "textile edges" is SE-B-469621, which shows edge-portions with flat folds, yielding a very limited liquid-stopping effect.

#### SUMMARY OF THE INVENTION

The object with the present invention is to provide a liquid-absorbent article with an edge-leakage barrier, which by means of an integrated resilient action effectively counteracts squeeze in a direction of height as well as in a sideways direction.

Said object is achieved by a liquid-absorbent article according to the present invention, the characteristics of which are apparent from the appended claim 1.

Said object is also achieved by a method and an apparatus for the manufacture of a liquid-absorbent article, the characteristics of which method and apparatus are apparent from the appended claims 6 and 9 respectively.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention will in the following be described in greater detail with a couple of embodiments with reference to the appended drawings, in which

Fig. 1 is a perspective view of a liquid-absorbent article according to the invention in the shape of a sanitary towel,

Fig. 2 is a cross-section along the line II-II in Fig. 1, showing the edge-barriers with elastic means in a first embodiment,

5 Fig. 3 is a broken cross-section corresponding to Fig. 2, but with elastic means in a second embodiment,

10 Fig. 4 diagrammatically shows, in perspective view, an apparatus for the manufacture of an absorbent article according to the invention,

Fig 5

and 6 shows a folding device included in the invention,

15 Fig. 7 shows a perspective view of the folding device and a fold-over device according to the invention,

Fig. 8

20 and 9 shows the fold-over device in a sideview and a topview respectively.

#### DESCRIPTION OF PREFERRED EMBODIMENTS

The sanitary towel shown in Fig. 1 and 2 generally comprises a substantially longitudinal absorption-body for liquids and a cover 2 enclosing the same. In the shown embodiment, the cover is provided with a liquid-pervious cover-sheet 3, which in an in-use position is facing the user. The liquid-pervious sheet 3 suitably consists of a non-absorbent cloth or a perforated plastic film. The cover is also provided with a preferably liquid-proof cover-sheet 4, for example made of plastic film or a hydrophobed fibre cloth, said cover-sheet 4 facing away from the user in a in-use position. In the shown embodiment, the liquid-pervious cover-sheet 3 extends over the central portion of the sanitary towel, over its entire length, but not over its width, while the liquid-proof cover-sheet 4 extends

outside of the longitudinal edges 5, 6 of the absorption body 1. In the shown embodiment, the cover is enclosed by two edge-strips 7, 8 of a skin-friendly "textile" material of for example fibre cloth (non-woven) of a polymer, which along an outer edge-portion 9, 10 are joined with the liquid-proof sheet forming flange-like longitudinal edge-portions 11, 12 of the sanitary towel. In the shown embodiment, the longitudinal edge-portions are each provided with a wing-like projection 11', 12', which by adhesive glue after folding over an edge of the panties may be fastened for fixing the sanitary towel. The joining between the different sheets in the cover 2 is for example achieved by heating the material to a melting temperature, for instance by ultra-sound. In a similar fashion, the inner edge-portions 13, 14 of the edge-strips 7, 8 are joined with the longitudinal edge-portions 15, 16 of the liquid-pervious cover-sheet 3. Instead of welding, i.e. melting the sheets together, gluing may of course be used. Furthermore, the cover-sheet 3 may alternatively extend completely under the edge-strips 7, 8 and be directly joined to the second cover-sheet 4.

In order to form longitudinal edge-leakage barriers 17, 18, the edge-strips 5, 6 are folded-over in order to form a fully closed tunnel-shape enclosing a channel 17'', 18'', whereby the inner edge-portions 15, 16 are inserted between the liquid-pervious sheet 3 and the underside of the edge-strips and are also joined to the same, for example by gluing or welding through the application of heat or ultra-sound. The tunnel shape may alternatively be formed solely by the cover-sheet 3 or by said sheet and the edge-strips 7, 8, which for example may be folded into an omega-shape with the sheet 3 as a base-sheet.

According to the invention, the folded-over edge-strips 5, 6 are provided with elastic means or fill-in materials which in the embodiment shown in Fig. 2 comprise a strip 24, 25 folded into a bellows-shape in cross-section, and made for example of fibre cloth (non-woven) holding the edge-barriers in an upright position and counteracting squeeze in a direction of height as well as in a sideways direction.

According to the embodiment in Fig. 2, a combination of textile edges and raised edge-leakage barriers has been achieved. The main component is the folded material inside the outer channels. The folded material should be of a type having a certain built-in resilient action in order to provide elastic support to the formed tunnel wall 17', 18'. Furthermore, the material should be substantially insensitive to wetting so that it maintains its characteristics during use. The material hitherto tested is a thermobound non-woven material of polypropylene fibres. Whilst other types of fibres with relatively high built-in resilient action are of course applicable, as are materials that have been treated (for example with a coating) so as to increase the resilient action. Each strip 24, 25 is thus provided with one or more longitudinal folds having a V- or Z-(zig-zag) shaped cross-section with a built-in pre-stress transverse the longitudinal direction of the strips. The strips are fastened at their edge-portions 24', 24'', 25', 25'' at least partially abutting the tunnel walls 17', 18'. In the shown embodiment, the folded strips 24, 25 are directed into an "upstanding" position so that they, by means of the pre-stressing, strive to rise up and support the tunnel walls 17', 18' even after a certain flattening, which may occur in a sales packaging. A highly resilient action is, however, achieved also in other transversal directions by the folding and the built-in elastic deformation resistance of the material.

5       The barrier may, due to its design, stop or slow down the liquid spreading enough for the liquid to have time to be absorbed by an underlying absorption body. The barrier may be more or less liquid-proof, by being made of a liquid-proof or hydrophobic material. The folding of the material and the thickness of the barrier also contribute to the liquid-stopping effect. It is, however, no disadvantage if the barrier is pervious to steam.

10      Fig. 3 shows the edge-leakage barrier 17 in a second embodiment, where the elastic means consists of a cord of for example foam material or fibre material, yielding a resilient action to the barriers in all directions, seen in a cross-section, i.e. a transversal elasticity. The cord 15     may advantageously be pre-stretched, i.e. pre-stressed in the longitudinal direction, into a transversal dimension below the transversal dimension of the channel during manufacture, which after off-loading yields a dimensional increase in a transversal direction and thereby a mechanical locking against the tunnel wall and a pre-stressing in 20     a transversal direction resulting in an increased resilient action.

25      Furthermore, the elastic means in both embodiments have both in common that they need not be fastened in the wall of the barrier, whereby unnecessary tensions are avoided.

30      Referring to Fig. 4, a method and an apparatus will be described, for the manufacture of the liquid-absorbent article according to the invention. Hereby, the description is limited to the manufacture of the portion of the cover 2, which supports the edge-leakage barriers 17, 18. The rest, i.e. the manufacture of the absorption body, the 35     liquid-proof sheet 4 and their joining together with the rest of the cover is known in the prior art and should not require a closer explanation.

The apparatus according to Fig. 4 starts off from one and the same material line 20, continually rolled off a storage roll 21. Outer edge-cutting cutter-rollers 22, 23 are included in the apparatus for cutting out two outer edge-strips 24, 25 in order to form the filling or the elastic means in the barriers. A centrally cutting cutter-roller 26 divides the interstitial material line 27 into two parts 28, 29 to form the edge-strips 7, 8 with the tunnel portions in the edge-leakage barriers 17, 18.

10

The outer edge-strips 24, 25 are each fed to their own folding device 30, 31 for folding the strips into a bellows-shaped cross-section, which will be described in greater detail below.

15

A fold-over device 32, 33 is also included in the apparatus for each part 28, 29 of the line, in which the barrier is formed by folding into a tunnel shape with the folded strip inserted, which will be described in greater detail below.

20

From a storage roll (not shown), a material line 34 is fed, which is to form the liquid-pervious cover-sheet 3. The completed edge-strips 7, 8 with associated barriers 17, 18 are fed spaced apart a distance adapted to the width of the material line 34, and joined together with the same and is brought through a joining device 35 for joining of the folded-over edge-strips 7, 8 with the longitudinal edges 35, 36 of the material line 34. The device 35, for example comprises a combined heating- and embossing device, utilizing ultra-sound.

25

The folding devices 30, 31 in the shown embodiment, comprise, as is best seen in Fig. 5 and 6, two rotating rollers 36, 37 having zig-zag-shaped tracks 38, engaging each other. When the strips 24, 25 are fed through these rollers they are given the same shape as the profile of the

30

35

tracks, i.e. a zig-zag-shape or a bellows-shape, after which the strips are fed onto the fold-over devices 32, 33, see Fig. 7.

5       The fold-over device 32, in the embodiment shown in Fig. 7, 8 and 9, comprises a fold-plate arrangement whose main part consists of a gap-like longitudinal, outwardly open chute 39, extending substantially transversally (see the arrow 40) to the feeding direction 41. Furthermore, two  
10      10 redirection-edges 42, 43 situated asymmetrically in the horizontal plane (the in-feed plane) is included, whilst the inlet of the chute 39 displays two, relative to the horizontal plane oblique redirection-edges 44, 45.

15      15 By the edge-strip being drawn along the longitudinal direction of the chute 39, the folded-over portion of the edge-strip is formed. From Fig. 7, it is apparent that the strip 24, folded into a bellows-shape, is fed somewhat angled into the chute 39 from the folding device 30, whereby the strip is guided and compressed towards the bottom 46 of the chute. Hereby, it is assured that the tunnel is subsequently closed without the fill-in material  
20      20 being trapped between the sealed sheets.

25      25 The invention is not limited to the embodiments described above and illustrated in the appended drawings, but may varied within the scope of the appended claims. For example, it is possible that the edge-leakage barriers are formed by folding of the cover-sheet 3 only. The strip 24,  
30      30 25 may be twined instead of all in combination with folding. The folding may also extend in a transversal direction. The folded strips may be laid with a print turning angle then shown. For example "laying", i.e. turned 90°, or obliquely, for example with a 45° inclination. The  
35      35 barriers may extend differently, they may for example extend transversely along the longitudinal direction of the

article or they may extend curve-shaped. The barriers may be included in other articles for hygiene protection, for example diapers, incontinence protection, whereby the barriers may be designed with considerably larger dimensions.

5       Claims

10       1. A disposable liquid-absorbent article to be worn by  
a user and comprising a substantially longitudinal absorp-  
tion body (1) and a cover (2) enclosing the same, which on  
a first side, facing the user in an in-use position,  
displays a liquid pervious first cover-sheet (3) and on a  
second side, facing away from the user in an in-use  
position, displays a second cover-sheet (4), whereby said  
first side is provided with at least one longitudinal  
15      liquid barrier means (17, 18) formed by a material layer  
(7, 8) folded into tunnel shape, forming a channel (17',  
18') with a longitudinal tunnel wall (17'', 18''),  
characterized in, that said portion folded  
into a tunnel-shape encloses longitudinal means (24, 25;  
20      19) with an elastically resilient supporting action acting  
in all directions transverse to the longitudinal direction  
of the article against the tunnel wall (17', 18') of the  
folded portion.

25       2. Article according to claim 1,  
characterized in, that said longitudinal means  
(24, 25) comprises a strip of material, folded in its  
longitudinal direction.

30       3. Article according to claim 1,  
characterized in, that said strip of material  
consists of fibre cloth.

35       4. Article according to claim 1,  
characterized in, that said longitudinal means  
(19) consists of an elastic strip of fibre- of foam material.

5. Article according to claim 4,  
characterized in, that the strip in an un-  
loaded condition displays a transversal dimension exceeding  
the transversal dimension of the channel (17'', 18'') but  
is prestressed into a reduced transversal dimension in and  
for mechanical locking longitudinally against the tunnel  
wall (17', 18').

10 6. Article according to claim 2, in which two longi-  
tudinal edge-strips (7, 8) form two edge-portions (9, 10)  
of the cover (2), characterized in, that a  
longitudinal portion of said edge-strips (7, 8) forms said  
portion folded-over into a liquid-barrier means (17, 18).

15 7. Method for the manufacture of a disposable liquid-  
absorbent article to be worn by a user, comprising a  
substantially longitudinal absorption body (1) and a cover  
(2) enclosing the same, which on a first side, facing the  
user in an in-use position, is provided with a liquid-  
pervious first cover-sheet (3) and a second side, facing  
away from the user in an in-use position, is provided with  
a second cover-sheet (4), whereby on said first side is  
arranged at least one longitudinal liquid-barrier means  
(17, 18), formed by folding a portion of a material line  
20 into tunnel-shape, forming a longitudinally closed tunnel  
wall (17', 18'), characterized in, that the  
folded-over portion in a first step is held open and that  
longitudinal means (24, 25; 19) with an elastically  
resilient supporting action acting in all directions  
25 transverse to the longitudinal direction of the article  
against the tunnel wall (17', 18') of the folded portion  
are inserted in the folded-over portion and that the folded  
portion in a second step is given said tunnel-shape  
30 enclosing said elastic means.

8. Method according to claim 7,  
characterized in, that said elastic means (24,  
25) is formed by folding a strip of material.

5 9. Method according to claim 8,  
characterized in, that said strip of material  
(24, 25) is formed by cutting off an outer edge-portion of  
said material line.

10 10. Apparatus for the manufacture of a disposable  
article to be worn by a user, comprising a substantially  
longitudinal absorption body (1) and a cover (2) enclosing  
the same, which on a first side, facing the user in a in-  
use position, is provided with a liquid-pervious first  
15 cover-sheet (3) and a second side, facing away from the  
user in a in-use position, is provided with a second cover-  
sheet (4), whereby, on said first side, at least one  
longitudinal liquid-barrier means (17, 18), formed by  
folding a portion of a material line into a tunnel-shape,  
20 forms a longitudinal closed tunnel-wall (17' 18'),  
characterized in, that the apparatus includes  
a fold-over device (32) for forming said folded-over  
portion into an open fold and devices (39) for continuous  
feeding into the open fold elastic means (24, 25; 19) with  
25 an elastically resilient supporting action acting in all  
directions transverse to the longitudinal direction of the  
article against the tunnel wall (17', 18') of the folded  
portion, and devices to seal the fold into a tunnel-shape.

30 11. Apparatus according to claims 10,  
characterized in, that the apparatus includes  
a folding device (30) for forming said longitudinal means  
by longitudinally folding a strip of material (24, 25).

35 12. Apparatus according to claim 10,

characterized in, that the folding device (32) comprises a fold-plate arrangement with redirection-edges (42, 43) for redirection of the material line (28, 29) towards an inlet to a gap-shaped, open chute (39).

13. An article as claimed in claim 1 substantially as hereinbefore described with reference to and as illustrated in Figures 1 and 2, or Figures 1 and 3 of the accompanying drawings.

14. A method as claimed in claim 7 substantially as hereinbefore described.

15. An apparatus as claimed in claim 10 substantially as hereinbefore described with reference to and as illustrated in Figures 4, 5, 6, 7, 8 and 9 of the accompanying drawings.

**Relevant Technical Fields**

(i) UK Cl (Ed.N) A5R (RPF, RPG); A3V  
 (ii) Int Cl (Ed.6) A61F 13/15

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Search Examiner  
L V THOMAS

Date of completion of Search  
14 AUGUST 1995

Documents considered relevant  
following a search in respect of  
Claims :-  
1-15

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Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	E:	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	&:	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2193625 A	(UNI-CHARM) see page 2 line 85 - page 3 line 13 and Figures 3 and 6	1-4
X	WO 91/10416 A1	(WEYERHAEUSER CO) see page 12 line 21 - page 13 line 2 and Figure 3	1-4, 6
X	US 5246432	(SUZUKI ET AL) see column 2 lines 20-49 and Figures 2 and 5	1-4

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